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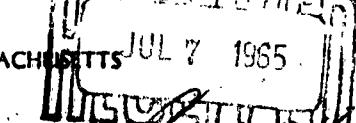
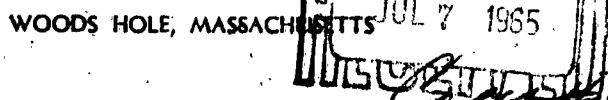
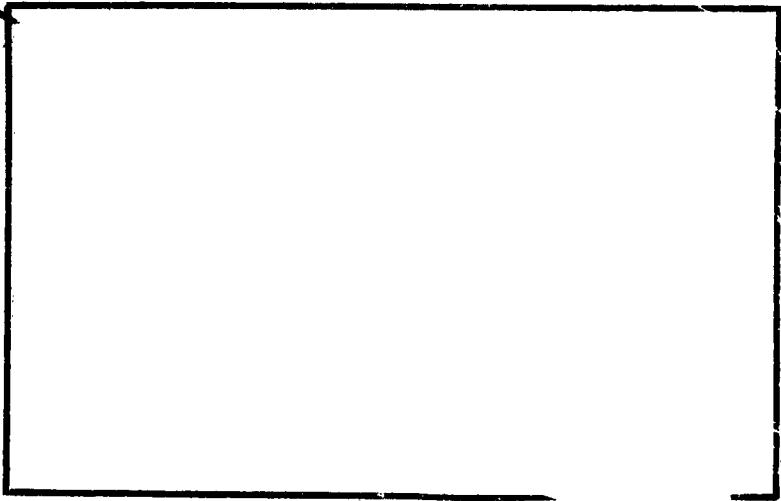
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Woods Hole, Massachusetts

Reference No. 50-26

MARINE METEOROLOGY

Conducted during the Period

1 April - 30 June 1950

Periodic Status Report No. 12  
Submitted to the Office of Naval Research  
Under Contract No. N6onr-277  
Task Order No. II, NR-082-021  
With Office of Naval Research

July 1950

APPROVED FOR DISTRIBUTION

*J. M. Smith*  
Director

This report contains a summary of work carried out by the Woods Hole Oceanographic Institution with the support of the Office of Naval Research. During the period 1 April - 30 June 1950 there were distributed:

Technical Report No. 6 entitled, "Diffusion of Water Vapor Through a Strong Turbulence Inversion" by Andrew F. Bunker.

The following papers were published: "Fluctuations of the Vertical Component of the Wind Associated with the Outflow of Cold Air from a Thunderstorm" by Andrew F. Bunker, Bulletin of American Meteorological Society, Vol. 31, No. 5, pp. 178-180, May 1950.

"Condensation Nuclei and Precipitation" by Alfred H. Woodcock, Journal of Meteorology, Vol. 7, No. 2, 161-162 pp. April 1950.

Correspondence: "Cloud Lines formed by the Smaller Hawaiian Islands" by Joanne Starr Malkus, Journal of Meteorology, Vol. 7, No. 2, 165-166 pp. April 1950.

"The Birth and Death of a Cumulus" by Joanne Starr Malkus. Weatherwise, Vol. 3, no. 3, 56-59, June 1950.

The following is a copy of the task order originating this project.

Task Order II - Constituting a part of Contract N6onr-277 with the Woods Hole Oceanographic Institution, and superseding dispatch advance notice of award effective April 1, 1947.

Section A - The contractor shall furnish the necessary personnel and facilities for, and conduct, in accordance with any instructions issued by the Scientific Office or his authorized representative, research in marine meteorology, such research to include:

- (1) The determination of the flux of long wave radiation in the air;
- (2) The study of the transport of heat and water by eddy diffusion;
- (3) The study of ocean cloud formation;
- (4) The establishment of a budget for the transport of water and heat in the Trades;
- (5) The establishment of the temperature of the thin film of water actually in contact with the air;
- (6) The determination of the weight and variations in time and locale of the sea salt present in a given volume of surface air;
- (7) Exploration of the theory of a shift in the correlation of dry temperature and water vapor pressure in the lower atmosphere;
- (8) Investigation of the turbulent eddies close to the sea surface; and
- (9) Measurement of the transfer of heat from a body of water to a cooler air mass.

The personnel connected with this project are:

Dr. B. Haurwitz, (Part-time)  
Associate in Marine Meteorology and Supervisor,

Andrew F. Bunker  
Research Associate in Meteorology,

Patricia A. Langwell, (part-time)  
Research Associate in Meteorology,

Alfred H. Woodcock, (part-time)  
Oceanographer,

Kenneth G. McCasland  
Senior Instrument Technician,

Donald Parson, Jr.  
Electronics Technician,

Nellie Anderson, (part-time)  
Computer.

(2) The study of the transport of heat and water vapor by eddy diffusion.

The study of the diffusion of water vapor through an inversion has been completed and Technical Report No. 6 has been published. A further study of the same problem is being considered in which the observations will be obtained from airplane soundings. It is proposed to follow an air mass from the Dakotas' region to the east coast with an airplane equipped with a humidity strip. More accurate measurements of the changes in the humidity above an inversion are hoped for by this method.

The data obtained over the Gulf of Maine on Oct. 20, 1949 has been analyzed. A report is being prepared which describes the distribution of turbulent mass exchange in several layers of the air mass. Analysis of the other Gulf of Maine data is being continued.

The heat-flow computer has not been satisfactorily completed as yet. Work on this instrument continues.

(3) The study of turbulence patterns in the atmosphere and their relation to temperature variations along the horizontal.

A study of this problem was presented by Patricia A. Langwell in Technical Report No. 5 and is now being prepared for publication in the Transactions of the American Geophysical Union. In this work a periodic heat source acting in the lower atmosphere and decreasing upwards was assumed.

Over islands with their typical convective phenomena a different approach seems indicated since here strong heating and friction by the land surface affects the air. An investigation of the distribution of temperature, horizontal and vertical air motions in such a situation is now in progress. Observations over Nantucket and adjacent islands by means of aeroplane and by time-lapse photographs of cloud development along the same lines as during the summer of 1949 will be made to check and amplify these investigations.

(6) The determination of the weights of sea-salt nuclei present in the air over the sea and the variation of the weight and number of these nuclei with time, position and altitude.

Work on this problem during the spring months has been devoted in part to writing and presenting two papers.

1. "Atmospheric sea salts and corrosion."
2. "Sea salt in a tropical storm."

The first paper was presented at the annual meeting of the American Society for Testing Materials at Atlantic City, June 30, 1950. It is to be published in the Proceedings of the A.S.T.M. (Editor R. E. Hess, 1916 Race St., Philadelphia, Pa.).

The second paper was presented at the national meeting of the American Meteorological Society, Salt Lake City, Utah, June 1950. It has been submitted to the Journal of Meteorology for publication.

Recently the use of multiple glass sampling strips, having widths of from 0.5 to 30 mm, has made possible an extension of the range of sea-salt nuclei weights sampled in marine air. Previous sampling with 1 mm wide glass strips was limited to larger nuclei of which about one was present in each liter of air (see figures 10 and 15, Jour. Mar. Res. 1949, VIII, 177-197). Multi-slide sampling makes possible the measurement of nuclei of which only one is present per cubic meter of air. The weight of sea salt in these sparsely distributed nuclei is about 10 times the weight of sea salt in the nuclei which number 1000 per cubic meter. This modified sampling technique will be used in further exploration of the distribution of sea-salt nuclei, particularly in and around marine cumulus clouds.

Work has been started on a paper which will present and discuss measurements of the distribution of sea-salt nuclei from near the sea surface up to a height of 9000 feet east of Miami, Florida. This study will also include data showing the distribution of sea-salt particle size within small cumulus clouds in the same area.